CARTER'S ENERGY PLAN:

ECONOMIC IMPACTS OF COAL CONVERSION

ON PENNSYLVANIA AND THE CONEG STATES

COMMONWEALTH OF PENNSYLVANIA
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A STAFF RESEARCH PAPER

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INTRODUCTION

Industrial conversion from oil and natural gas to coal is part of President Carter's proposed energy plan. The plan also includes other proposals that are aimed at reducing domestic consumption of petroleum and natural gas and at increasing domestic energy supplies. These proposals are designed to reduce substantially United States dependence on foreign energy supplies by 1985.[1]

Several recently completed studies examine in broad terms the implications of coal conversion nationally and for multi-state regions. The purpose of this effort is to study in greater detail the impacts of coal conversion on Pennsylvania and other CONEG states,[2] focusing principally on the industrial sector of the economy.

The President's coal conversion program contains several key regulatory policies that apply to new as well as existing major fuel burning installations in the manufacturing sector. These are summarized in Tables I and II below.

Table I.: Summary of Coal-Conversion Policy Program for the Industrial Sector

1.1 : Regulatory Policy

MFBI STATUS	Regulatory Policy or Policies
New	• Prohibits use of natural gas and petroleum except that: - a permanent exemption is granted by an FEA Officer; - adequate coal supply is subject to periodic interruptions over the life of the MFBI facility; - environmental constraints cannot be overcome; - the use of coal is not financially feasible.
Existing	• FEA Administrator may identify categories of existing fuel burning installations which have coal - burning capability and may prohibit them from using either natural gas or oil or both. He may also identify categories of such installations which do not have coal-burning capability and prohibit them from burning natural gas. • EPA must certify all conversion orders within 270 days as meeting or not meeting clean air requirements.

SOURCE: Executive Office of the President
Energy Policy and Planning

TABLE II

Taxes and Financial Incentives under the
President's Industrial Coal Conversion Program

Measures	Industry
. Taxes	
Taxable Use	Fuel use over 500 billion BTu/yr.
Natural Gas Tax	
Effective:	1979
Level:	Based on a target price keyed to the regional price of distillate
Phasing:	Target price rises to equal the BTU equivalent cost of distillate before tax in 1985
Oil Tax	
Effective:	1979
Level:*	0.90/bbl (initial)
Phasing:	Tax rises to $3.00/bbl in 1985
. Financial Incentives	
Investment Tax Credit	Industrial users investing in alternative energy property may elect to claim an additional 10% tax credit
	or
Rebate	Elect to receive a rebate against current (but not past) consumption taxes, with an indefinite carry-forward on the investment

Source: Replacing Oil and Gas with Coal and Other Fuels in the Industrial and Utility Sectors, Executive Office of the President, Energy Policy and Planning, June 2, 1977 p.3.

ENERGY DEPENDENCY - CONEG STATES[3]

CONEG states are heavily dependent upon oil and coal for manufacturing. There is less reliance on natural gas as an energy source. In 1974, Major Fuel Burning Installations (MFBI's) in the CONEG states consumed 30 percent of the Nation's total oil allocation for industrial use, 18 percent of the coal allocation, and 5 percent of the natural gas used by industry (Table III).

Pennsylvania uses more natural gas and more coal, than the rest of the CONEG States combined. Pennsylvania also uses more oil in major fuel burning installations than Connecticut, Massachusetts, Rhode Island and Vermont combined. Pennsylvania, New York, New Jersey and Maine rank first, second, third and fourth respectively in the use of oil for major fuel burning installations (Table IV).

ENERGY INTENSIVE INDUSTRIES - CONEG STATES[4]

The most energy intensive industries within manufacturing are: petroleum and coal products; primary metals; stone, clay and glass; and paper products. These industries in Pennsylvania employ 282,000 workers, which is nearly 23 percent of the total manufacturing labor force. Fuel costs per dollar of value added in these industries range from 7 to 13 percent (Table V).

Specialization in these industries explains, in large part, why Pennsylvania exceeds all other CONEG states in total energy consumption.

TABLE III

COMPARATIVE ENERGY CONSUMPTION PATTERN
BY ENERGY SOURCE: CONEG, 1974

		Type of Energy Used & Percent of U		
		Gas	Oil	Coal
I.	U.S. TOTAL:	100.00	100.00	100.00
II.	CONEG STATES	5.12	28.90	17.79
	PENNSYLVANIA	3.73	7.70	14.94
	New York	0.33	7.17	2.78
	New Jersey	0.88	7.00	0.0**
	Connecticut	0.06	1.50	0.003
	Maine	0.0**	4.02	0.04
	Massachusetts	0.11	1.36	0.01
	Rhode Island	0.0**	0.13	0.00*
	Vermont	0.0**	0.02	0.00*

Notes:

* insignificant at two decimal plac
** zero percent indicates either non-significant use of particula energy source and/or specific data were not available at the time preparing the table.

SOURCE: FEA SURVEY C-602-S-0
WASHINGTON, D.C., 1975.

TABLE IV

RANK ORDER OF CONEG STATES IN ENERGY USE FOR MFBI's, 1974

STATE	COAL EQUIVALENT OF ALL FORMS OF ENERGY (in thousands of tons)	BTU EQUIVALENT* IN QUADRILLIONS	RANK
PENNSYLVANIA	19917	505.9	1st
NEW YORK	6377	162.0	2nd
NEW JERSEY	5195	132.0	3rd
MAINE	2271	57.7	4th
CONNECTICUT	930	23.6	5th
MASSACHUSETTS	926	23.5	6th
RHODE ISLAND	77	2.0	7th
VERMONT	11	.3	8th

* Conversion factor used for obtaining BTU equivalent was obtained from "Bituminous Coal Facts, 1972". The factor used was 25.4 million BTU per ton.

SOURCE: FEA Survey C-602-S-0
Washington, D.C., 1975

TABLE V

FUEL COSTS AS A PERCENTAGE OF VALUE-ADDED BY MANUFACTURER

A-I

Manufacturing:		U.S.	CONEG	PA.	N.J.	N.Y.	CONN.	MAINE	MASS.	R.I.	VERMONT
All Industry		2.43	2.59%	3.92	2.83	1.66	1.80	8.64	1.69	1.88	2.06
SIC											
20	Food & Kindred Products	1.83	2.35	2.34	2.56	2.18	1.47	3.39	2.19	3.55	6.00
21	Tobacco Products	0.64	1.02	1.02	----	----	----	----	----	----	----
22	Textile Mill Products	2.17	2.69	2.35	2.94	1.05	4.99	4.10	3.95	4.35	----
23	Apparel & Other Tex. Products	0.32	0.34	.55	0.49	0.21	0.42	0.23	0.31	0.59	----
24	Lumber & Wood Products	2.38	2.83	3.66	1.49	1.39	4.95	4.37	2.46	----	2.94
25	Furniture & Fixtures	0.74	1.12	1.07	0.58	1.24	0.87	2.08	1.44	----	2.39
26	Paper & Allied Products	7.19	9.52	7.32	7.66	7.32	8.93	24.85	8.19	6.88	6.79
27	Printing & Publishing	0.28	0.29	.42	0.48	0.17	0.40	0.82	0.42	0.41	0.31
28	Chemicals & Allied Products	4.56	3.77	3.28	3.85	4.10	4.21	----	----	3.10	----
29	Petroleum & Coal Products	9.35	----*	12.75	----	----	----	----	----	----	----
30	Rubber & Plastic Products	1.37	2.14	3.05	1.86	1.63	2.32	3.26	1.94	0.80	2.45
31	Leather & Leather Products	0.75	0.94	.80	1.19	0.77	----	1.28	1.12	----	----
32	Stone, clay & glass products	7.53	7.95	9.16	8.70	7.75	4.48	11.44	3.57	10.24	2.72
33	Primary Metal Industries	6.61	8.99	11.34	5.84	7.32	4.58	----	2.39	2.16	----
34	Fabricated Metals Products	1.00	1.41	1.73	1.10	1.01	1.30	----	1.83	1.66.	----
35	Machinery, except electrical	0.57	.79	.81	0.83	0.82	0.93	0.80	0.56	0.86	0.59
36	Electrical Equip. & Supplies	0.50	.74	.83	0.61	0.83	0.52	----	0.63	0.47	----
37	Transportation Equip. & Supplies	0.72	.99	1.05	0.96	0.98	0.86	----	1.36	0.72	----
38	Instruments & Related Products	0.50	.74	.38	1.04	0.80	0.60	----	0.67	0.96	----
39	Miscellaneous Manufacturing Ind.	0.61	.76	1.12	0.61	0.48	1.51	2.00	0.85	0.60	----

SOURCE: U.S. CENSUS OF MANUFACTURES, 1974, Department of Commerce

COST OF COAL CONVERSION[5,6]

The minimum capital cost related to the coal conversion program is the retrofit cost which is estimated at $662 million for the CONEG states, if all boilers most capable of conversion will be required by law to convert to coal. Capital cost could reach a maximum of $1.6 billion in the CONEG states if all non-exempt boilers are replaced rather than retrofitted. (Table VII). Pennsylvania's share of the capital cost would range from $290 million to $690 million.

These capital cost estimates assume a new 250 mm BTU/hr. coal burning boiler costs $10 million; retrofit costs $1.3 million; and scrubber equipment costs $5.0 million for the same size boiler.

The total capital cost of conversion for a particular industrial plant is determined by such factors as the physical characteristics of the facility, specific regulatory policies that apply, and price differentials for coal among states and regions:

- Combustor Size - Size affects costs since coal equipment, including pollution control equipment, is characterized by economies of scale. In addition, size is a determinant of the stringency (and therefore the cost) of pollution control requirements.
- Capacity Utilization - This factor obviously affects attractiveness of coal investments, since it determines the relative importance of capital costs compared to fuel cost savings. The direct use of coal will be more economical for industrial process operations (which operate at 75-90 percent capacity

TABLE VII

MANDATORY CONVERSION: CAPITAL COST ESTIMATES OF REPLACING & RETROFITING MFBIs WITH AN ESTIMATED CAPACITY OF 250 MILL. BTU PER HOUR IN CONEG; IN MILLION DOLLARS

STATE	# NO. OF BOILERS	CAPITAL COSTS OF CONVERSION					
		Replacement Cost		Retrofit Cost		Total Cost Estimate	
		Replacement	Scrubbers	Retrofit	Scrubbers	Replacement	Retrofit
PENNSYLVANIA	46	460	230	59.8	230	690	289.8
NEW JERSEY	23	230	115	29.9	115	345	144.9
NEW YORK	18	180	90	23.4	90	270	113.4
CONNECTICUT	5	50	25	6.5	25	75	31.5
MASSACHUSETTS	8	80	40	10.4	40	120	50.4
MAINE	5	50	25	6.5	25	75	31.5
VERMONT RHODE ISLAND	0	---	---	----	---	---	-----
CONEG	105	1,050	525	136.5	525	1,575	661.5

SOURCES:

1. Congressional Record, Volume 123, Washington, D.C. August 2, 1977, p. E5047
2. FEA MFBI SURVEY, Washington, D.C., 1975
3. Industrial Coal Useage in the Northeast, Discussion Draft, (unpublished report)

utilization) than heating plants (which operate at 25-40 percent load factors).

- Coal Capability - If the unit was designed originally to fire coal, the capital costs of converting will be less than the cost differential between a new gas/oil firing and a new coal firing unit.
- Remaining Useful Life of Facility - The shorter the useful life of an investment, the lower the rate of return will be. This factor is most important for investments in units originally designed to fire coal.
- Region - Location affects cost primarily through fuel prices. The most important differences relate to delivered coal costs which, for example, will be higher for a plant in California or New England than for a facility in Ohio.
- Environmental Controls - Pollution control equipment is a major expense of using coal, and in some instances such costs are the largest element of capital costs.
- Fuel Type - This factor affects costs since different types of fuel have different prices.

The existing federal corporate tax structure also affects the cost of conversion under the industrial coal conversion program. The fuel user tax is deductible. At the 48 percent federal tax rate, a firm effectively pays only 52 percent of the user taxes. The firm can avoid reductions in net income by shifting the burden of the user tax on to the consumer.

A major provision in the program is a rebate which reduces a firm's fuel tax liability by the amount that the firm invests in coal or other non-oil or gas related equipment. However, the existing federal corporate tax structure reduces the dollar-for-dollar rebate incentive, so that a firm must pay at least 38 cents for every dollar invested for conversion.

Under the rebate provision, when a firm invests capital in coal burning facilities, every dollar of eligible investment earns a rebate of one dollar to reduce the fuel tax liability. In receiving the rebate, the firm loses an income tax deduction equivalent to the amount of user tax. The net result is a cash grant of 52 cents after taxes for every dollar of eligible investment. In addition, the firm also receives a 10 percent investment tax credit. This raises the firm's after-tax grant to 62 cents for every dollar of investment. Industry can also make investments in any year in excess of tax liability since investment costs which are not rebated can be carried forward indefinitely to offset future fuel tax liability.

MANDATORY CONVERSION[7]

If the President's coal conversion proposals are implemented, 105 major fuel burning installations in the CONEG states would have to convert to coal. Pennsylvania would be hardest hit since 46 of the 105 boilers are in the state, principally in the primary metals, and the electrical and non-electrical machinery industries. (Table VII).

The capital cost of replacing these boilers in Pennsylvania is estimated at $690 million, which is 44 percent of the estimated replacement cost for all CONEG states combined.

The capital costs to retrofit existing boilers are much less. For example, if the 46 non-coal fired boilers in Pennsylvania which qualify for mandatory conversion were to retrofit, the capital costs will be approximately $290 million, which is $400 million less than capital costs for replacement. In CONEG, capital costs would reduce from $1.6 billion for replacement to $662 million for retrofitting the existing 105 boilers that would have to be converted under the President's program.

NON-MANDATORY CONVERSION COST[8]

The projected industrial fuel tax liability for Pennsylvania's 16 major fuel burning installations which do not have to convert under the President's program total $862 million over the seven year period between 1979 and 1985 (Table VIII). This represents one-third of the tax liability for all CONEG states affected by non-mandatory regulations. New Jersey, which has more gas fired boilers than Pennsylvania will pay $1.4 billion in fuel user taxes over the seven-year period. Combined, Pennsylvania and New Jersey will carry 85 percent of the total tax burden for all CONEG states ($2.6 billion).

For Pennsylvania, the capital cost of replacement for the 16 boilers in the non-mandatory group is estimated at $240 million as compared to $101 million for retrofit costs. In either case, conversion costs would be substantially less than the $862 million long-term fuel tax liability imposed by the President's program.

TABLE VIII

NON-MANDATORY CONVERSION CAPITAL COST ESTIMATES OF REPLACING AND RETROFITTING MFBIs WITH AN ESTIMATED CAPACITY OF 250 MILL. BTU PER HOUR IN CONEG; IN MILLION DOLLARS

STATE	NO. OF BOILERS				CAPITAL COSTS OF CONVERSION						TOTAL		
		Fuel Types			Replacement Cost		Retrofit Cost		Total Cost Estimate		User Taxes Paid 1979-85		
	Total	Oil	Gas	Other	Replacement	Scrubbers	Retrofit	Scrubbers	Replacement	Retrofit	Oil	Gas	Total
PENNSYLVANIA	16	12	1	3	160	80	20.8	80	240	100.8	26.7	835.1	861.8
NEW JERSEY	14	10	4	0	140	70	18.2	70	210	88.2	22.2	1336.2	1358.4
NEW YORK	4	3	1	0	40	20	5.2	20	60	25.2	6.7	334.0	340.7
CONNECTICUT	0				0	0	0	0	0	0	0	0	0
MASSACHUSETTS	7	7	0	0	70	35	9.1	35	105	44.1	15.6	0	15.6
MAINE	7	6	0	1	70	35	9.1	35	105	44.1	13.3	0	13.3
VERMONT RHODE ISLAND	0				0	0	0	0	0	0	0	0	0
CONEG	48	38	6	4	480	240	62.4	240	720	302.4	84.5	2505.3	2589.8

SOURCES:

1. Congressional Record, Volume 123, Washington, D.C., August 2, 1977, P E5047
2. FEA MFBI Survey, Washington, D.C. 1975
3. Industrial Coal Useage in the Northeast, Discussion Draft (unpublished report), 1976
4. President Carter's Energy Proposals: A Perspective, C.B.O., P 35
5. Bituminous Coal Facts 1972, P. 85, National Coal Association
6. Regional Natural Gas Tax Estimates were obtained from FEA PIES Run A158569C

This means that the offset of high capital costs by long-term fuel tax savings provides an incentive to convert even those boilers in the non-mandatory group.

EXEMPTIONS FROM FUEL USER TAXES

Partial Exemptions[9]- Energy using boilers partially exempted from the President's program will not be required to convert to coal, nor will they have to pay a user tax on oil. However, a user tax on gas as well as a conservation tax on oil will be levied. By 1985, the user tax on oil rises to $3.00 per barrel as compared to a $1.00 per barrel conservation tax.

Tax costs related to partially exempt boilers in Pennsylvania and other CONEG states are shown in Table IX. The states hardest hit are Pennsylvania and New York which would pay $4.2 billion and $2.7 billion in taxes respectively over a seven-year period from 1979 to 1985. By comparison, other CONEG states will not be heavily burdened.

Total Exemptions[10] Boilers with no coal-burning capability are totally exempted and will in no way be affected by the President's industrial coal-conversion program. They will not be required to convert to coal and will not have to pay fuel-user taxes or conservation taxes.

In the CONEG states, approximately 149 non-coal fired boilers would be totally exempted from the President's program (Table X). Pennsylvania has 42 boilers that will be totally exempted.

TABLE IX

1979-1985 GAS AND OIL TAX ASSESSMENT FOR MFBIs
TO BE PARTIALLY EXCLUDED FROM COAL CONVERSION IN CONEG

STATE	NO. OF BOILERS				TOTAL TAXES PAID 1979-85		
	Total	Oil	Gas	Other	Oil	Gas	Total
PENNSYLVANIA	39	20	5	14	24.2	4175.5	4199.7
NEW JERSEY	32	32	0	0	38.7	0	38.7
NEW YORK	43	34	8	1	44.1	2672.4	2716.5
CONNECTICUT	10	10	0	0	12.1	0	12.1
MASSACHUSETTS	10	10	0	0	12.1	0	12.1
MAINE	15	14	0	1	16.9	0	16.9
VERMONT RHODE ISLAND	2	2	0	0	2.4	0	2.4
CONEG	151	122	13	16	147.6	6847.9	6995.5

SOURCES:

1. Congressional Record, Volume 123, Washington, D.C., August 2, 1977, P. E5047
2. FEA MFBI Survey, Washington, D.C. 1975
3. Industrial Coal Useage in the Northeast, Discussion Draft (unpublished report), 1976
4. President Carter's Energy Proposals: A Perspective, C.B.O., P 35
5. Bituminous Coal Facts 1972, P. 85, National Coal Association
6. Regional Natural Gas Tax Estimates were obtained from FEA PIES Run A158569C

TABLE X

SUGGESTED FEA MFBI PERMANENT EXEMPTIONS UNDER INDUSTRIAL COAL CONVERSION PROGRAM: 1979-1985

Political Unit	# of Exemptions
CONEG	149
- PENNSYLVANIA	42
- New Jersey	39
- New York	32
- Connecticut	15
- Maine	13
- Massachusetts	7
- Vermont	0
- Rhode Island	1

SOURCE: FEA MFBI SURVEY, 1975, Washington, D.C., 1975

EFFECTS OF COAL CONVERSION ON THE COAL MINING INDUSTRY

A main issue related to Carter's energy plan deals with capabilities of producing coal in sufficient quantities to meet future needs. The plan calls for an annual increase of 200 million tons by 1985 to respond to new national demands. Of this increase, industry will consume about 176 million tons (Table XI). The largest absolute increase in coal consumption will be in the Southwest, South Atlantic, Midwest, and Mid-Atlantic states.

What worries some experts is that the coal conversion program relies heavily upon an increase in demand for coal among present industrial consumers of oil and gas, but does not provide special incentives for coal production. The Office of Technology Assessment has expressed concern that without special incentives, shortages of coal are likely to arise. This would contribute to price increases and perhaps could discourage conversion to coal.

REGIONAL SUPPLY EFFECTS

A recent tendency has been the shift in regional emphasis away from Eastern mines to Western mines. An important reason for this is that most Eastern coal is of medium to high sulfur quality and is found in deep, thin seams, which are relatively expensive to mine.

Carter's plan increases the reliance on Eastern coal through the provisions which require desulfurization equipment on all new coal burning facilities, which in turn, makes Eastern high-sulfur coal more competitive with Western low-sulfur coal.

FEA estimates that under Carter's energy plan, Northern Appalachia will supply about one-fifth of the national demand for coal by 1985 (Table XII). Production will increase from 180 million tons

TABLE XI

EFFECT OF THE PRESIDENT'S PROGRAM ON
COAL CONSUMPTION IN 1985, IN MILLIONS OF TONS

FEA REGION*	Base	% of Total	President's Program	% of Total	Change in Coal Useage	Change as a % of Initial Use
NEW ENGLAND	.2	.10	3.7	1.0	3.5	1750.0
NY/NJ	8.2	3.9	19.0	4.9	10.8	131.7
MID-ATLANTIC	56.5	27.2	78.1	20.3	21.6	38.2
S-ATLANTIC	26.3	12.7	50.6	13.2	24.3	92.4
MIDWEST	86.7	41.7	109.9	28.6	23.2	26.8
S-WEST	6.1	2.9	59.3	15.4	53.2	872.1
CENTRAL	8.2	3.9	13.2	3.4	5.0	61.0
N-CENTRAL	8.5	4.1	20.7	5.4	12.2	143.5
WEST	4.1	2.0	21.0	5.5	16.9	412.2
N-WEST	3.1	1.5	8.6	2.2	5.5	177.4
TOTAL	207.9	1.00	384.1	100	176.2	84.8

SOURCE: FEA Project Independence Evaluation System (PIES) Runs A148542C and A158569C

* For FEA definition of Regions, see Appendix A-4

NOTE: "BASE" refers to coal production estimates without the President's Program

TABLE XII

COAL REGIONAL PRODUCTION SUMMARIES IN MILLION SHORT TONS PER YEAR: WITH/WITHOUT PRESIDENT'S PROGRAM FOR 1985

Region*	1975 Total	1985 Total			LOW SULFUR						MEDIUM SULFUR					
					Surface			Deep			Surface			Deep		
		Base	Pres. Prog.	Change	Base	Pres. Prog.	Change	Base	Pres. Prog.	Change	Base	Pres. Prog.	Change	Base	Pres. Prog.	Change
N. Appalachia	180	188.9	257.4	68.5	.3	.3	0	.3	.4	.1	23.7	24.2	.5	15.5	53.4	37.9
Central Appalachia	189.4	319.3	348.5	29.2	16.7	18.0	1.3	13.3	16.7	3.4	18.5	18.5	0	51.3	51.9	.6
S. Appalachia	22.4	20.2	21.1	.9	----	----	---	2.2	3.1	.9	10.5	10.5	0	6.2	6.2	0
Midwest	137.1	177.0	203.4	26.4	----	----	---	1.2	2.0	.8	5.1	5.1	0	19.5	24.7	5.2
West	101.0	360,3	434.3	74	240.4	236.2	4.2	7.2	47.0	39.8	95.0	127.7	32.7	.8	2.8	2
Total U.S.	639.9	1065.7	1264.7	199	257.4	254.4	3.0	24.2	69.2	45.0	152.8	186.0	33.2	93.3	138.9	45.6

* For definition of Regions, see Appendices A-5 and A-6

SOURCE: FEA PIES Runs A148542C and A158569C

NOTE: "Base" refers to coal production estimates without the President's Program.

"Pres. Prog." refers to coal production estimates under the President's Program.

TABLE XII (Continued)

COAL REGIONAL PRODUCTION SUMMARIES IN MILLION SHORT TONS PER YEAR: WITH/WITHOUT PRESIDENT'S PROGRAM FOR 1985

	HIGH SULFUR						METAL LURGICAL						TOTAL BY ORIGIN					
	Surface			Deep			Surface			Deep			Surface			Deep		
Region*	Base	Pres. Prog.	Change	Base	Pres. Prog.	Change	Base	Pres. Prog.	Change	Base	Pres. Prog.	Change	Base	Pres. Prog.	Change	Base	Pres. Prog.	Change
N. Appalachia	52.7	53.3	.6	49.4	75.4	26.0	4.5	4.7	.2	42.5	45.8	3.3	81.2	82.4	1.2	107.7	175.0	67.3
Central Appalachia	2 7	2.7	0	14.2	15.1	.9	59.8	66.1	6.3	142.8	159.5	16.7	97.7	105.3	7.6	221.6	243.2	21.6
S. Appalachia	----	----	----	----	----	----	1.4	1.4	0	-----	-----	----	11.9	11.9	0	8.4	9.3	.9
Midwest	87.0	88.0	1	64.1	83.6	19.5	----	----	---	-----	-----	----	92.1	93.1	1.0	84.9	110.3	25.4
West	8.1	8.2	.1	----	3.8	3.8	.6	.6	0	8	8	0	344.2	372.7	28.5	16.1	61.6	45.5
Total U.S.	150.6	152.2	1.6	127.7	177.9	50.2	66.3	72.8	6.5	193.3	213.3	20.0	627.1	665.3	38.1	438.6	599.4	160.8

*For definition of Regions, see Appendices A-5 and A-6

SOURCE: FEA PIES Runs A148542C and A158569C

NOTE: "Base" refers to coal production estimates without the President's Program.

"Pres. Prog." refers to coal production estimates under the President's Program.

mined in 1975 to 257 million tons in 1985. Without the Carter program, the 1985 production level would be only 189 tons. Most of the coal produced in Northern Appalachia will come from mines in Pennsylvania and West Virginia.

REGIONAL PRICE EFFECTS

FEA forecasts assume small increases in coal prices by 1985 relative to the increases in quantities demanded (Table XIII). This is because the Nation's coal reserves are so vast that a great deal more coal could be produced without substantial increases in production costs.

FEA forecasts expect the average market price per ton of coal produced in the U.S. to reach $36.33 by 1985 under the Carter plan, compared to $33.54 per ton without the plan. Larger price increases are forecasted for Western coal than Eastern coal. The gap between Western and Eastern coal prices narrows by 1985, thus enhancing the competitive position of Pennsylvania and other Eastern coal-producing regions.

EFFECTS ON CAPITAL INVESTMENT

About $5.7 billion of capital investment into coal research and development will be needed for expansion of productive capacity to meet Carter's 1985 production goals.[11] Financing may be a problem in Pennsylvania and other Eastern mining districts where smaller companies must pay higher costs for investment capital than the conglomerates that dominate the Western mining districts. New mine safety regulations, wildcat strikes, and a history of labor-management disputes are other factors which may reduce Eastern mine owners' willingness to invest the large sums needed to expand their operation

TABLE XIII

EFFECT OF THE PRESIDENT'S PROGRAM ON 1985 DELIVERED COAL PRICES BY REGION (PRICES ARE EXPRESSED IN DOLLARS PER TON)

	NEW ENGLAND			NY/NJ			MID-ATLANTIC			S-ATLANTIC		
	Base[1]	Pres.[2] Prog.	% Change	Base	Pres. Prog.	% Change	Base	Pres. Prog.	% Change	Base	Pres. Prog.	% Change
INDUSTRIAL												
Coal, Industrial	$38.37	$39.93	4.07	$36.12	$37.84	4.76	$33.91	$35.80	5.57	$37.78	$39.45	4.4
Coal, Metallurgical	30.00	------	----	45.79	46.38	1.29	43.41	44.10	1.59	47.65	48.24	1.2
UTILITY												
Coal-High Sulphur	26.82	27.25	1.60	24.54	24.98	1.79	22.10	22.60	2.26	26.30	26.74	1.7
Coal-Low Sulphur	33.50	33.99	1.46	31.49	31.98	1.56	29.51	30.08	1.93	33.04	33.53	1.5
Coal-Sub-Bitum.	38.26	38.26	0	35.30	35.30	0	26.58	20.64	-22.35	33.42	33.42	0
Coal-Lignite	30.17	31.96	5.93	34.30	36.12	5.31	30.11	15.55	-48.36	26.73	21.59	-19.2

SOURCE: FEA PIES Runs A148542C and A158569C

NOTE: [1] "Base" refers to coal production estimates without the President's Program.

[2] "Pres. Prog." refers to coal production estimates under the President's Program.

TABLE XIII (Continued)

EFFECT OF THE PRESIDENT'S PROGRAM ON 1985 DELIVERED COAL PRICES BY REGION (PRICES ARE EXPRESSED IN DOLLARS PER TON)

	MIDWEST			S-WEST			CENTRAL			N. CENTRAL		
	Base[1]	Pres. Prog.[2]	% Change	Base	Pres. Prog.	% Change	Base	Pres. Prog.	% Change	Base	Pres. Prog.	% Change
INDUSTRIAL												
Coal, Industrial	$32.89	$35.65	8.4	$30.38	$36.16	16.0	$31.55	$34.74	10.1	$25.92	$29.64	14.4
Coal, Metallurgical	44.32	45.05	1.6	46.80	47.56	1.6	42.96	43.56	1.4	43.44	43.44	0
UTILITY												
Coal-High Sulphur	21.09	22.12	4.9	19.40	21.74	12.1	20.00	21.07	5.4	16.26	18.92	16.4
Coal-Low Sulphur	28.09	30.30	7.9	25.29	31.16	23.2	26.69	29.43	10.3	19.58	23.01	17.5
Coal-Sub-Bitum.	24.30	24.30	0	24.88	24.88	0	22.18	22.18	0	13.86	13.86	0
Coal-Lignite	24.99	21.17	-15.3	15.47	15.47	0	22.01	19.94	- 9.4	25.19	21.37	15.12

SOURCE: FEA PIES Runs A148542C and A158569C

NOTE: [1] "Base" refers to coal production estimates without the President's Program.

[2] "Pres. Prog." refers to coal production estimates under the President's Program.

TABLE XIII (Continued)

EFFECT OF THE PRESIDENT'S PROGRAM ON 1985 DELIVERED COAL PRICES BY REGION (PRICES ARE EXPRESSED IN DOLLARS PER TON)

	WEST			N. WEST			U.S. AVERAGE		
	Base[1]	Pres.[2] Prog.	% Change	Base	Pres. Prog.	% Change	Base	Pres. Prog.	% Change
INDUSTRIAL									
Coal, Industrial	$33.04	$37.70	14.1	$33.01	$36.81	11.5	$33.54	$36.33	8.32
Coal, Metallurgical	52.07	52.07	0	30.00	----	----	44.55	45.20	1.46
UTILITY									
Coal-High Sulphur	22.75	25.43	11.8	23.09	19.80	-14.2	23.25	23.96	3.05
Coal-Low Sulphur	27.39	31.70	15.7	25.01	28.81	15.2	29.84	31.39	5.19
Coal-Sub-Bitum.	28.82	28.82	0	25.63	25.63	0	22.90	22.95	.22
Coal-Lignite	24.21	24.21	0	14.97	----	----	16.75	15.67	-6.45

SOURCE: FEA PIES Runs A148542C and A158569C

NOTE: [1] "Base" refers to coal production estimates without the President's Program.

[2] "Pres. Prog." refers to coal production estimates under the President's Program.

EFFECTS ON MINING EMPLOYMENT

Approximately 27,000 additional miners will be needed in Pennsylvania and other coal-producing regions in Northern Appalachia if the President's 1985 production goals are to be met.[12] Employment impacts in Eastern mines are apt to be greater than in Western mines because more men are required to mine an equivalent amount of coal. Productivity is low in underground Eastern mines, averaging about 11 tons per man-day. Surface mining operations in the Western states average 45 tons per man-day.[13]

Although job opportunities in Eastern mines are expected to increase considerably in the long-run, manpower shortages may develop in the short-run since miners have to be trained and since the hazards of deep mining and generally poor working conditions still make it a relatively unattractive occupation for young workers.

An accute manpower problem involves foremen. Federal law requires that each underground crew be led by a foreman with at least two years of experience in underground mining. Because miners must give up their union benefits for relatively small increases in pay to become foremen, there is a chronic shortage of crew leaders in Eastern underground mines.[14]

EFFECTS OF COAL CONVERSION ON CONEG'S COMPETITIVE ECONOMIC POSITION

Among CONEG states, short-term costs for conversion will be highest in Pennsylvania, New York and New Jersey. They have the largest number of boilers which must convert and they also will carry the heaviest burden for fuel-user and conservation taxes.

These states will be disadvantaged in the short-term, but in the long-term their competitive position will be enhanced by fuel cost savings and reductions in user taxes.

Pennsylvania is a major coal-producing state as well as a major coal-consuming state. Because of this, the number of jobs and amount of income generated as the result of the Carter plan will be greater than in most other states.

Since Pennsylvania is a major supplier of coal, firms in the state will be relatively advantaged compared to other coal-converters in CONEG and the rest of the U.S. Under the Carter plan, FEA estimates that Pennsylvania will be able to deliver coal to consuming industries at relatively low market prices.

Pennsylvania also will derive appreciable economic benefits from interdependent industries producing boilers, hopper cars, and various other products for which demand will be stimulated by the coal conversion program. In boiler shops alone, Pennsylvania employs 12,000 workers in 105 establishments.[15]

The state and local government sectors of the economy will be affected only to the extent to which increased production in coal and related industries generate additional tax revenues or place greater demands on the public sector for services and new infrastructure development.

Any gains in a state's corporate net income tax (CNI) resulting from new economic stimulus will be partially offset by reductions in the CNI tax due to provisions in the coal conversion program which allow tax deductions for fuel-user and conservation taxes.

Adequate transportation facilities are prerequisite for implementation of the President's coal conversion program. Hence, revitalization of railroads in the Northeast is essential to realization of the full development potential in large coal producing states such as Pennsylvania.

FOOTNOTES:

1. President Carter's Energy Proposals: A Perspective, Congressional Budget Office, Washington, D.C.; June 1977.
2. CONEG States: - These include: Pennsylvania, New Jersey, New York, Connecticut, Massachusetts, Vermont, and Rhode Island.
3. Energy dependency is defined in this study as the degree of reliance on natural gas, oil and coal. It is measured by the ratio of all sources of energy used (excluding purchased electricity) for manufacturing by a specific state to the total energy used in the U.S. for manufacturing.
4. Energy intensity is defined as the relative emphasis placed upon the use of all sources of energy, except purchased electricity, to meet manufacturing needs. It is measured by the ratio of total fuel cost to total value added by each industry group of the manufacturing subsector. An industry group in the manufacturing subsector of a CONEG State is classified as energy intensive if its ratio of total fuel cost to total value-added exceeds the average for the CONEG State, and the U.S. for similar manufacturing industry group.
5. Cost estimates of coal conversion are based on unpublished data obtained from an FEA National survey of major fuel burning installations (MFBIs). The purpose of the FEA survey conducted in 1974 was to assess coal-conversion capabilities of all MFBIs in the 50 states.

OSPD assigned priorities to MFBIs (See appendices A-1, A-2 and A-3) by applying to the FEA survey data, criteria related to coal conversion exemptions as stated in the President's industrial coal-conversion program:

a) a supply of coal cannot be obtained which is adequate, reliable nor which substantially exceeds the cost of imported petroleum as a primary energy source over the useful life of the plant;

b) site limitations exist;

c) technically infeasible (in the case of non-boilers only);

d) environmental standards would be violated;

e) financially infeasible (in the case of existing facilities only).

Application of the criteria resulted in groupings of MFBIs in priority order as shown in Appendix A-1. Appendix A-2 is the actual questionnaire used by FEA in obtaining survey of responses to the FEA survey questions by priority assignment for all CONEG states. Appendix A-3 shows a summary of responses to the FEA Survey questions by priority assignment for all CONEG states. Underlying this summary are detailed FEA survey data which were put into machine readable form by OSPD for purposes of analysis.

6. The term priority denotes the rating of potential candidates for industrial coal-conversion in order of declining importance. (see footnote no. 5).

7. Mandatory conversion refers to MFBIs identified by OSPD as being most capable of using coal in CONEG under President Carter's industrial coal-conversion program. (see Appendix A-1).

8. MFBIs in the non-mandatory conversion group are defined by OSPD as MFBIs which have some coal burning capability but

which are deficient in three of the five FEA criteria for inclusion into the exemption category under the President's industrial coal-conversion program. (see Appendix A-1).

9. MFBIs in the partially exempt group will not be required to convert to coal and will be partially exempted from user and conservation taxes, based on OSPD priority assignment. (see Appendix A-1).

10. MFBIs in the totally exempt group are identified as having no coal-conversion capability and will neither be required to convert to coal nor pay user or conservation taxes, based on OSPD priority assignment (Appendix A-1).

11. Based on expansion cost estimates cited in "The Phasing Out of Oil and Gas Used for Boiler Fuel (The Cost of Converting to Coal), Economics and Statistics Division, Edison Electric Institute, March 7, 1977.

12. Employment increases calculations are given in Appendix A-7.

13. Estimates on productivity were obtained from a report of the U.S. Department of the Interior, "Coal" FEA Project Independence Blueprint, Final Task Force Report, November, 1974, P. 48.

14. Analysis of the Proposed National Energy Plan, Congress of the United States, Office of Technology Assessment, June 3, 1977.

15. Statistics for Manufacturing Industries, 1975, Pennsylvania Industiral Census Series, Release Number M-1-75

A P P E N D I C I E S

APPENDIX A-1

PRIORITY SCHEMA FOR DELINEATING POTENTIAL COAL BURNING MFBIS IN CONEG

MFBI GROUP	Priority Assignment*	Criteria	Expected Administrative Action (FEA)
A. Mandatory Conversion	1 - 3	- limited by two of the five constraints for inclusion into the exemption category	- mandatory conversion order
B. Non-mandatory Conversion	4	- limited by three of the five constraints for inclusion into the exemption category	- non-mandatory conversion order but not exempted from user conservation taxes
C. Exemptions from User & Conservation Taxes			
C.1 Partial Exemptions	5 - 6	- limited by four of the five constraints for inclusion into the exemption category	- exemptions from user taxes but not conservation taxes
C.2 Total Exemptions	7	- limited by all of the five constraints for inclusion into the exemption category	- exemptions from both user and conservation taxes

* See footnote no. 5.

SOURCES: a. FEA SURVEY C-602-S-0, Washington, D.C. 1975

b. U.S. National Energy Legislation, H.R. 6831, May 2, 1977

APPENDIX A-2

FEA C-602-S-0

FEDERAL ENERGY ADMINISTRATION
Washington, D.C. 20461

APPROVED BY GAO
B-181254 (S75022)
EXPIRES 6-30-75

This Report is Mandatory Under P.L. 93-275

MAJOR FUEL BURNING INSTALLATION COAL CONVERSION REPORT

DO NOT FILL IN [1–5]

FILL IN THIS PAGE FOR EACH COMBUSTOR OVER 99 MILLION BTUs/HR

MFBI NAME _____

SECTOR II COMBUSTOR DATA

1. COMBUSTOR NUMBER [6]

2. WHAT KIND OF COMBUSTOR IS THIS?
1 = boiler 2 = burner 3 = other combustor of fuel

3. COMBUSTOR CAPACITY (x 10⁶ BTU/HR)

4. MANUFACTURER _____

5. DATE INSTALLED (YEAR) 19

6. a. If Combustor has been Modified to be Capable of Burning Coal, What Year was it Modified? 19
b. How was it Modified?

7. DO YOU INTEND TO INSTALL A TOPPING TURBINE ON THIS COMBUSTOR?

a. If Yes, Will You Need to:
(1) Replace Your Combustor.
(2) Modify Your Combustor.
(3) Make No Combustor Modification.

b. If the Answer to 7(a) was "1" or "2", Do You Intend to Modify/Replace Your Combustor so that You Can Burn Coal?

8. PRIMARY ENERGY SOURCE FOR EXISTING COMBUSTOR
1 = coal 2 = residual 3 = distillate 4 = gas 5 = other (specify) _____

9. ALTERNATE ENERGY SOURCE FOR EXISTING COMBUSTOR
1 = coal 2 = residual 3 = distillate 4 = gas 5 = other (specify) 6 = no alternate.
List secondary alternate energy sources, if any: _____

10. IF COAL IS THE PRIMARY ENERGY SOURCE, DO YOU INTEND TO CONTINUE ITS USE?

11. IF COAL IS NOT THE PRIMARY ENERGY SOURCE, DO YOU INTEND TO CONVERT TO COAL IN THE NEAR FUTURE?

12. WAS THIS COMBUSTOR ORIGINALLY DESIGNED TO BE CAPABLE OF BURNING COAL?

13. WAS COAL EVER BURNED IN IT?

14. CAN COAL NOW BE BURNED IN THIS COMBUSTOR?

15. IS LAND AVAILABLE FOR COAL STORAGE?

16. IF THE ANSWER TO NO. 12 OR 13 IS "YES", IS ANY OR ALL OF THE COAL BURNING SUPPORT EQUIPMENT STILL IN PLACE?

17. IF THE ANSWER TO NO. 12 OR 13 IS "YES", IS ANY OR ALL OF THIS EQUIPMENT STILL OPERATIONAL? [20]

18. IF THE ANSWER TO NO. 15 OR 17 WAS "NO", PLEASE IDENTIFY ANY ANTICIPATED ACQUISITION OR REFURBISHING OF COAL HANDLING AND FIRING EQUIPMENT.

COMBUSTOR NUMBER _____
MFBI NAME _____

FILL IN THIS PAGE FOR EACH COMBUSTOR OVER 50 MILLION BTU/HR

19. IF COAL WAS EVER USED AS THE PRIMARY FUEL SOURCE PRIOR TO 1973 GIVE (for the last year coal was used):

a. Year 19 [ ] 20

b. Rank of Coal _____

c. Percent Ash by Weight (to the nearest percent) _____

d. Percent Sulfur by Weight (to the tenth of a percent) _____ [ ][ ]

e. BTU/lb _____

f. Quantity _____ Tons/Year

g. Other Unique Characteristics

_____

_____

_____

h. Method of Delivery: (Train, Truck, Barge, etc.)

_____

i. If Coal is not Presently Being Used, Do You Anticipate that it Could be Obtained if you Were to Convert? [ ]

j. If Not, Why Not?

_____

20. ESTIMATE YOUR ANNUAL NON-COAL FUEL SAVINGS IF YOU WERE TO CONVERT TO COAL

	QUANTITY	
RESIDUAL	[ ][ ][ ][ ] 35	10^3 bbls/yr
DISTILLATE	[ ][ ][ ][ ] 39	10^3 bbls/yr
GAS	[ ][ ][ ][ ] 43 45	10^3 MCF/yr

21. 1974 ANNUAL FUEL USE

	% ASH (by weight)	% SULFUR (by weight)	BTU CONTENT ($\times 10^3$)		QUANTITY	
COAL	____	____	[ ][ ][ ][ ] 47	(lb)	[ ][ ][ ][ ] 54	10^3 tons/yr
RESIDUAL		____	[ ][ ][ ][ ] 55	(gal)	[ ][ ][ ][ ] 62	10^3 bbls/yr
DISTILLATE		____	[ ][ ][ ][ ] 63	(gal)	[ ][ ][ ][ ] 70	10^3 bbls/yr
GAS		____	[ ][ ][ ][ ] 71	(MCF)	[ ][ ][ ][ ] 78	10^3 MCF/yr

COMBUSTOR NAME _____

MFBI NAME _____

FILL IN THIS PAGE FOR EACH COMBUSTOR OVER 99 MILLION BTU/HR

22. 1973 FUEL USE

[ ][ ] [ ][ ][ ][ ][ ] DO NOT FILL IN
73 80 1 5

	% ASH (by weight)	% SULFUR (by weight)	BTU CONTENT (x10⁶)		QUANTITY	
COAL	____	____	[ ][ ][ ][ ] (lb) 6		[ ][ ][ ][ ] 13	10³ tons/yr
RESIDUAL		____	[ ][ ][ ][ ] (gal) 14		[ ][ ][ ][ ] 21	10³ bbls/yr
DISTILLATE		____	[ ][ ][ ][ ] (gal) 22		[ ][ ][ ][ ] 29	10³ bbls/yr
GAS		____	[ ][ ][ ][ ] (MCF) 30		[ ][ ][ ][ ] 37	10⁶ MCF/yr

23. INDICATE (to the nearest percent) THE PERCENT OF COMBUSTOR OUTPUT THAT IS DEVOTED TO:

ELECTRIC GENERATION [ ][ ][ ] 38

SPACE HEATING [ ][ ][ ] 41

PROCESS STEAM [ ][ ][ ] 44

OTHER (Specify) [ ][ ][ ] 47

SECTION III AIR QUALITY

1. STACK NUMBER [ ]

2. STACK HEIGHT (Feet Above Ground) [ ][ ][ ]

3. CURRENTLY INSTALLED POLLUTION CONTROL EQUIPMENT AS PERTAINS TO THE COMBUSTOR (Answer Yes or No with a "1" or "0" respectively).

a. Precipitator (Also referred to as Dust Collector) [ ]

Type (Centrifugal, Electrostatic, Etc.) _____

Date Installed _____

Date Last Operated _____

Design Efficiency (%) _____

Actual Efficiency (%) _____

b. FLUE GAS DESULFURIZATION (FGD) EQUIPMENT (Also referred to as Scrubber or Sulfur Dioxide Absorber) [ ] 55

Type (MAG Ox, LIMESTONE, Etc.) _____

Date Installed _____

Date Last Operated _____

Design Efficiency (%) _____

Actual Efficiency (%) _____

% Availability _____

APPENDIX A-3

ASSIGNMENT OF PRIORITIES

FEA SURVEY QUESTION

1. Was this combustor originally deisgned to be capable of burning coal?
2. Was coal ever burned in it?
3. Can coal now be burned in this combustor?
4. If coal is not presently being used, do you anticipate it could be obtained if you were to convert?
5. Is land available for coal storage?
6. If the answer to No. 1 or 2 is "Yes" is any of the coal burning support equipment still in place?
7. If the answer to No. 1 or 2 is "Yes" is any or all of this equipment still operational?

1. Was this combustor originally designed to be capable of burning coal?
2. Was coal ever burned in it?
3. Can coal now be burned in this combustor?
4. If coal is not presently being used, do you anticipate it could be obtained if you were to convert?
5. Is land available for coal storage?
6. If the answer to No. 1 or 2 is "Yes" is any of the coal burning support equipment still in place?
7. If the answer to No. 1 or 2 is "Yes" is any or all of this equipment still operational?

1. Was this combustor originally designed to be capable of burning coal?
2. Was coal ever burned in it?
3. Can coal now be burned in this combustor?
4. If coal is not presently being used, do you anticipate it could be obtained if you were to convert?
5. Is land available for coal storage?
6. If the answer to No. 1 or 2 is "Yes" is any of the coal burning support equipment still in place?
7. If the answer to No. 1 or 2 is "Yes" is any or all of this equipment still operational?

RESPONSES

FIRST PRIORITY GROUPING

Yes	No	Yes	Yes	Yes	Yes
No	Yes	Yes	Yes	Yes	Yes
Yes	Yes	Yes	Yes	Yes	Yes
Yes	Yes	Yes	No	Yes	Yes
Yes	Yes	Yes	Yes	Yes	Yes
Yes	Yes	Yes	Yes	Yes	No
Yes	Yes	Yes	Yes	No	Yes

SECOND PRIORITY GROUPING

Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
No	Yes	Yes	No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Yes	Yes	No	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
No	No	Yes	Yes	No	No	Yes	No	No	Yes	Yes	No
Yes	Yes	Yes	Yes	Yes	No	Yes	No	No	Yes	No	Yes
Yes	Yes	Yes	Yes	No	Yes	No	Yes	Yes	Yes	No	Yes
Yes	Yes	No	No	No	Yes	Yes	Yes	Yes	Yes	No	No.

THIRD PRIORITY GROUPING

Yes	Yes	Yes	No	No	Yes	Yes
Yes	Yes	Yes	Yes	Yes	Yes	Yes
No	No	No	No	No	Yes	No
Yes	No	No	Yes	Yes	No	Yes
Yes	Yes	No	Yes	Yes	No	No
No	Yes	Yes	Yes	No	No	Yes
No	No	Yes	No	Yes	No	No

FEA SURVEY QUESTION

1. Was this combustor originally designed to be capable of burning coal?
2. Was coal ever burned in it?
3. Can coal now be burned in this combustor?
4. If coal is not presently being used, do you anticipate it could be obtained if you were to convert?
5. Is land available for coal storage?
6. If the answer to No. 1 or 2 is "Yes" is any of the coal burning support equipment still in place?
7. If the answer to No. 1 or 2 is "Yes" is any or all of this equipment still operational?

1. Was this combustor originally designed to be capable of burning coal?
2. Was coal ever burned in it?
3. Can coal now be burned in this combustor?
4. If coal is not presently being used, do you anticipate it could be obtained if you were to convert?
5. Is land available for coal storage?
6. If the answer to No. 1 or 2 is "Yes" is any of the coal burning support equipment still in place?
7. If the answer to No. 1 or 2 is "Yes" is any or all of this equipment still operational?

1. Was this combustor originally designed to be capable of burning coal?
2. Was coal ever burned in it?
3. Can coal now be burned in this combustor?
4. If coal is not presently being used, do you anticipate it could be obtained if you were to convert?
5. Is land available for coal storage
6. If the answer to No. 1 or 2 is "Yes" is any of the coal burning support equipment still in place?
7. If the answer to No. 1 or 2 is "Yes" is any or all of this equipment still operational?

FOURTH PRIORITY GROUPING

Yes	Yes	No	Yes
Yes	Yes	Yes	Yes
No	No	No	No
Yes	No	Yes	No
No	Yes	Yes	No
No	No	No	Yes
No	No	No	No

FIFTH PRIORITY GROUPING

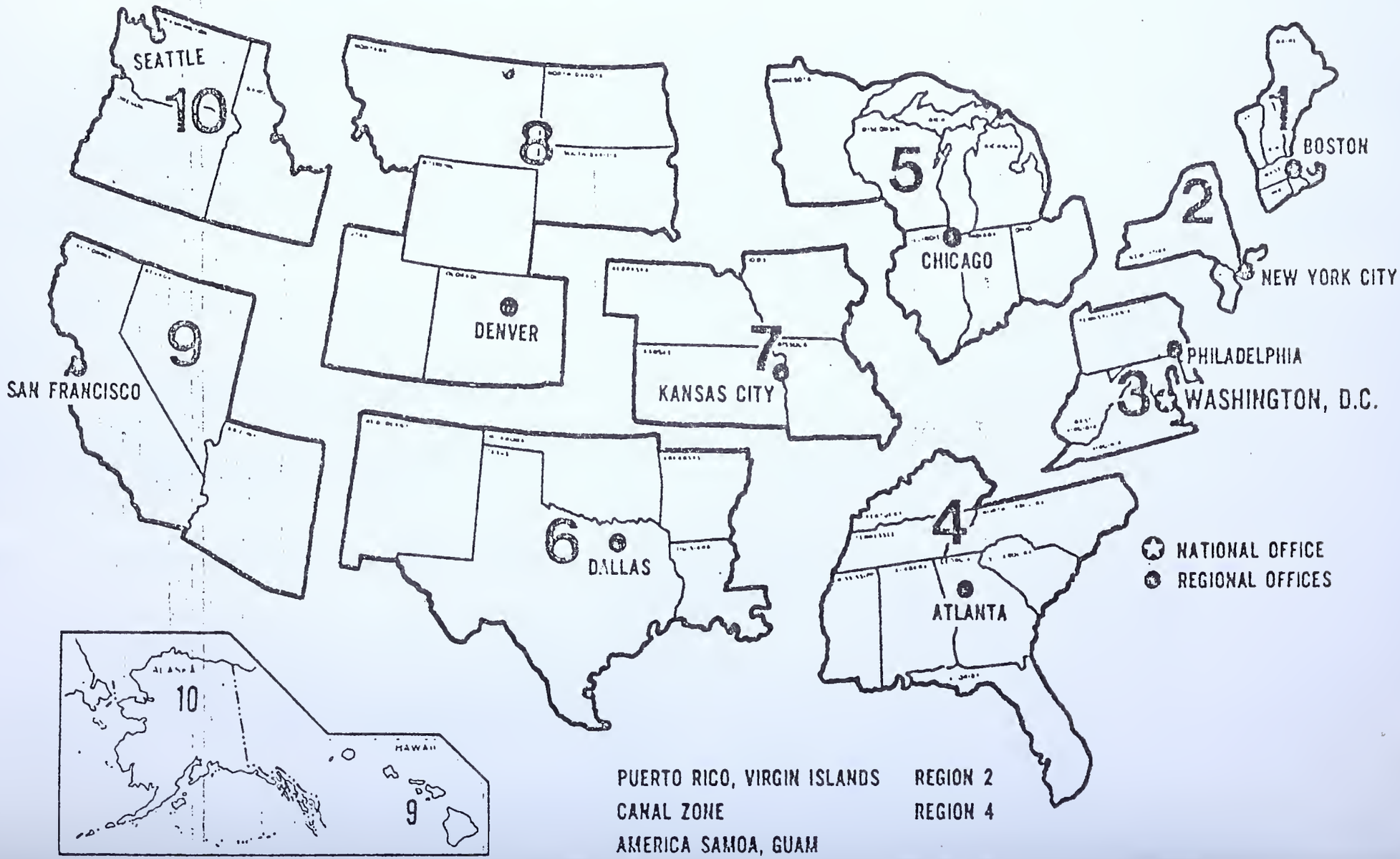
No	Yes	No
Yes	Yes	Yes
No	No	Yes
No	No	No
No	No	No
Yes	No	No
No	No	No

SIXTH PRIORITY GROUPING

Yes	No	No	No	No	Yes	Yes	Yes	No	Yes
No	Yes	Yes	No	No	No	No	No	No	No
No	No	No	No	No	No	No	No	No	No
No	No	No	No	Yes	No	No	No	Yes	Yes
No	No	No	Yes	Yes	No	No	Yes	No	No
Yes	No	Yes	No	No	No	Yes	No	No	No
Yes	No	Yes	No	No	No	No	No	No	No

FEA SURVEY QUESTION	SEVENTH PRIORITY GROUPING
1. Was this combustor originally designed to be capable of burning coal?	No
2. Was coal ever burned in it?	No
3. Can coal now be burned in this combustor?	No
4. If coal is not presently being used, do you anticipate it could be obtained if you were to convert?	No
5. Is land available for coal storage?	No
6. If the answer to No. 1 or 2 is "Yes" is any of the coal burning support equipment still in place?	No
7. If the answer to No. 1 or 2 is "Yes" is any or all of this equipment still operational?	No

Federal Energy Administration - REGIONS



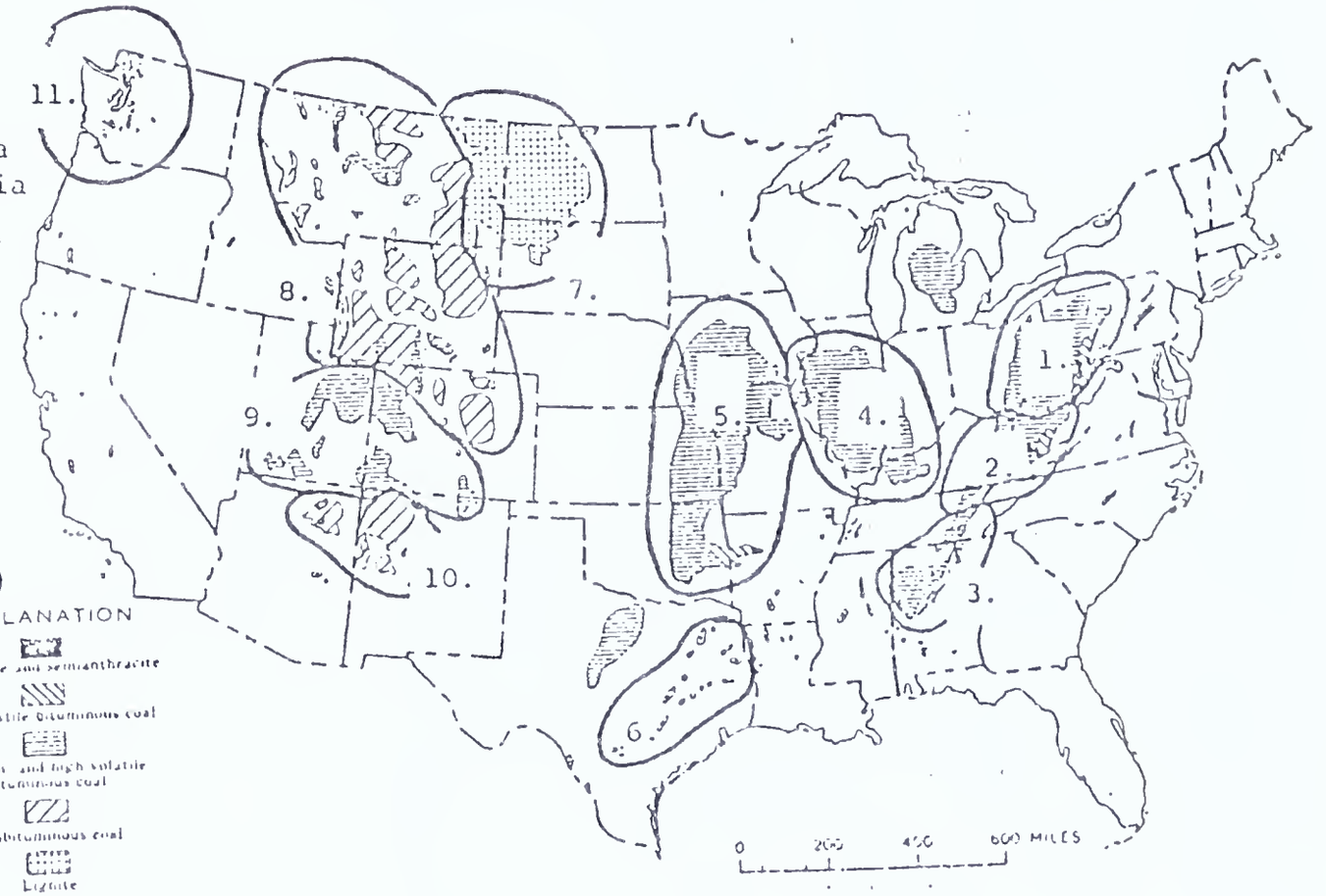
PUERTO RICO, VIRGIN ISLANDS	REGION 2
CANAL ZONE	REGION 4
AMERICA SAMOA, GUAM TRUST TERRITORY OF THE PACIFIC ISLANDS	REGION 9

PIES COAL SUPPLY REGIONS

REGIONS

1. Northern Appalachia
2. Central Appalachia
3. Southern Appalachia
4. Midwest
5. Central West
6. Gulf
7. Eastern Northern Great Plains
8. Western Northern Great Plains
9. Rockies
10. Southwest
11. Northwest
12. Alaska (not shown)

WEST



APPENDIX A-6

SUMMARY OF SUPPLY CURVES AMONG
THE NCM SUPPLY REGIONS

Supply Region	Number of Coal Type Supply Curves
I. Northern Appalachia	
1. Pennsylvania (PA)	11
2. Ohio (OH)	7
3. Maryland (MD)	5
4. West Virginia, north (NV)	11
II. Central Appalachia	
5. West Virginia, south (SV)	8
6. Virginia (VA)	10
7. Kentucky, east (EK)	12
8. Tennessee (TN)	9
III. Southern Appalachia	
9. Alabama (AL)	7
IV. Midwest	
10. Illinois (IL)	8
11. Indiana (IN)	8
12. Kentucky, west (WK)	5
V. Central West	
13. Iowa (IA)	3
14. Missouri (MO)	4
15. Kansas (KS)	4
16. Arkansas (AR)	4
17. Oklahoma (OK)	11
VI. Gulf	
18. Texas (TX)	1
VII. Eastern Northern Great Plains	
19. North Dakota (ND)	5
20. South Dakota (SD)	3
21. Montana, east (EM)	2
VIII. Western Northern Great Plains	
22. Montana, west (WM)	6
23. Wyoming (WY)	11
24. Colorado, north (CN)	2
IX. Rockies	
25. Colorado, south (CS)	12
26. Utah (UT)	5
X. Southwest	
27. Arizona (AZ)	2
28. New Mexico (NM)	8
XI. Northwest	
29. Washington (WA)	7
XII. Alaska	
30. Alaska (AK)	1
TOTAL 30 Regions	192 Coal Type Supply Curves

APPENDIX A-7

CALCULATION OF MINING EMPLOYMENT INCREASE

Methodology:

The increase in supply was obtained from F.E.A.
PIES estimates (See Table XII in the text) based on the productivity figures provided in the text and average number of work-days per year data, employment requirement estimates were obtained.[1]

Calculations:

$$\frac{\text{Annual Change in Supply}}{\text{Annual Productivity/man}} = \text{change in employment needs}$$

Surface Mines:
$$\frac{1.2 \text{ million tons}}{224 \text{ work days/yr} \times 45 \text{ tons/day}} = 119$$

Deep:
$$\frac{67.3 \text{ million tons}}{224 \text{ work days/yr} \times 11 \text{ tons/day}} = 27313$$

27432 Total

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[1] Based on a report by the Committee on Interior and Insular Affairs


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